Civil Aviation Authority of Sri Lanka

AVIATION SAFETY NOTICE

ASN No: 063	Ref No: OPS/2009/02	File Ref: OP/21/10/2

Recipients	:	1. Holders of Air Operator Certificate issued by DGCA, 2. Prospective applicants for Air Operator Certificate for commercial Air Transport Operations.
01. Subject	:	**Guidance for operators for conducting constant descent final approach (CDFA) / Stabilized approach for Non-precision approaches.**
02. Nature	:	Advisory
03. Issue No	:	02
04. Status	:	Amendment to ASN 063 Issue No 01 dated 20 December 2004
05. Effective Date	:	With immediate effect
06. Validity	:	Until further notice
07. Contact Person	:	Inquiries may be directed, preferably by letter to, Deputy Director Operations, Civil Aviation Authority, No. 64, Galle Road, Colombo 3, Sri Lanka. Telephone: 94 11 2 399534 e-mail ddops@caa.lk
08. Availability	:	A copy of this document is available for reference at the technical library of the Civil Aviation Authority. Copies can be collected at reproduction cost.
09. Applicability	:	Holders of Air Operator Certificate issued by DGCA for commercial air transport operation.
10. Comments	:	Comments (if any) on the contents of this Aviation Safety Notice may be forwarded to the contact person. However the Aviation Safety Notice will come into effect on the date shown therein notwithstanding any objection or comment made by any person or party unless and until an amendment to the Aviation Safety Notice is issued afresh by the Director General.
11. Notice	:	Holders of Air Operator Certificates issued by DGCA for operation of aircraft for commercial air services are hereby instructed to make use of the guidance specified in the

02 June 2009

attachment hereto, when making Standard Operating Procedures (SOP) for pilots.

12. History of Revision : To give effect to the Advisory Circular AC (SA) 011 issued o 19 January 2009 by COSCAP-SA

13. Related ASNs : Nil

14. Action Required : To comply with the applicable procedures specified in the attachment by the holders of Air Operator Certificates for Commercial Air Transport Operation.

13. Checklist : List of current ASNs is as follows:

ASN No	Issue No	Date of Applicability	Remarks
ASN002	01	10.03.2000	nil
ASN003	01	18.08.2000	nil
ASN004	01	13.02.2001	nil
ASN005	01	26.03.2001	nil
ASN007	01	15.09.2001	nil
ASN008	02	16.11.2006	Replaced ASN 008 issue no 01
ASN009	01	18.02.2002	nil
ASN010	01	18.02.2002	nil
ASN011	01	18.02.2002	nil
ASN012	01	18.02.2002	nil
ASN013	01	08.02.2002	nil
ASN014	01	01.03.2002	nil
ASN015	01	01.03.2002	nil
ASN016	01	01.03.2002	nil
ASN017	.02	10.03.2005	Replaced ASN 017 issue no 01
ASN018	01	20.03.2002	nil
ASN019	01	01.04.2002	nil
ASN021	01	01.04.2002	nil
ASN022	01	08.04.2002	nil
ASN023	01	01.06.2002	Replaced ASN no 003
ASN024	01	02.09.2002	nil
ASN025	02	15.10.2002	Replaced ASN no 001
ASN026	01	15.10.2002	nil
ASN027	01	12.12.2002	nil
ASN028	01	12.03.2003	nil
ASN029	01	21.03.2002	nil
ASN030	01	10.07.2002	nil
ASN031	01	15.072003	Replaced ASN no 006
ASN032	01	25.07.2003	nil
ASN033	02	25.08.2005	Replaced ASN no 033 issue no 01
ASN034	01	11.09.2003	nil
ASN035	01	12.09.2003	nil
ASN036	01	12.09.2003	nil
ASN037	01	13.10.2003	nil
ASN038	01	07.06.2004	nil
ASN039	03	05.01.2007	Replaced ASN no 039 issue no 02
ASN040	01	07.07.2004	nil
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ASN042	03	05.01.2007	Replaced ASN no 042 issue no 02
ASN043	02	12.08.2004	Amendment to ASN no 013
ASN044	02	13.03.2006	Replaced ASN no 044 issue no 01
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ASN046	01	14.09.2006	nil
ASN047	03	05.01.2007	Replaced ASN no 047 issue no 02
ASN048	02	05.01.2007	Replaced ASN no 048 issue no 01
ASN049	01	20.09.2004	nil
ASN051	01	20.09.2004	nil
ASN052	01	20.09.2004	nil
ASN053	03	15.11.2006	Replaced ASN 053 issue no 02
ASN054	02	16.01.2008	Replaced ASN 054 issue no 01
ASN055	03	13.03.2009	Replaced ASN 055 issue no 02
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ASN057	01	01.12.2005	nil
ASN058	01	01.12.2005	nil
ASN059	-	-	Not issued yet
ASN060	02	05.08.2005	Replaced Page no 01 of the attachment to the ASN no 060 issue no 01
ASN061	02	05.08.2005	Replaced Page no 01 of the attachment to the ASN no 061 issue no 01
ASN062	01	01.04.2005	nil
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ASN065	01	06.04.2005	nil
ASN066	01	16.05.2005	nil
ASN067	01	16.05.2005	nil
ASN068	01	18.05.2005	nil
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ASN070	01	18.05.2005	nil
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ASN072	01	18.05.2005	nil
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ASN076	01	16.06.2005	nil
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ASN078	01	21.12.2005	nil
ASN079	01	16.09.2005	nil
ASN080	01	07.11.2005	nil
ASN081	02	25.06.2006	Replaced ASN no 081 issue No. 01
ASN082	01	23.11.2005	nil
ASN083	01	01.12.2005	nil
ASN084	01	16.12.2005	nil
ASN085	01	05.01.2006	nil
ASN086	02	05.05.2008	Replaced ASN No 086, 087 and 088 issued on 2006 April 2006.
ASN089	01	10.05.2006	nil
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ASN091	01	15.06.2006	nil
ASN092	01	09.11.2007-	nil
ASN093	01	26.05.2008	nil
ASN094	01	02.06.2006	nil
ASN095	01	25.09.2006	nil
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ASN101	01	28.01.2008	nil
ASN102	01	04.03.2008	nil
ASN103	01	01.08.2008	nil
ASN104	01	28.08.2008	nil
ASN105	01	07.082008	nil
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ASN107	01	12.01.2009	nil
ASN108	01	20.05.2009	nil

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GUIDANCE FOR OPERATORS FOR CONDUCTING CONTINUOUS DESCENT FINAL APPROACH (CDFA) FOR NON-PRECISION APPROACHES

1. PURPOSE

a. Study has shown that the risk of Controlled Flight into Terrain is high on non-precision approaches. While the procedures themselves are not inherently unsafe, the use of the traditional Step Down Descent technique for flying non-precision approaches is prone to error, and is therefore discouraged. Operators should reduce this risk by emphasizing training and standardization in vertical path control on non-precision approach procedures. Operators typically employ one of three techniques for vertical path control on non-precision approaches. of these techniques, the Continuous Descent Final Approach (CDFA) technique is preferred. Operators should use the CDFA technique whenever possible as it adds to the safety of the approach operation by reducing pilot workload and by lessening the possibility of error in flying the approach.

b. The ICAO *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS), prescribes a stabilised approach in that the aircraft must be in a stabilised position at a certain altitude. For an optimum approach technique, the stabilisation should not only exist at a certain position, but should be a continuous state, established as early as possible after joining the final approach track. An optimum landing manoeuvre requires the aircraft to reach the decision altitude or point in a stabilised state, in order to allow sufficient time for the pilot to assess the visual cues for the decision to land or to go around. The aircraft's attitude and position relative to the runway should be similar in each approach, to the greatest extent possible, in order to permit the pilot to utilize Standard Operating Procedures (SOP) which are similar for all types of instrument approaches.

c. Advantages of CDFA

Compared to the steep descent (dive-and-drive) approach technique, where the aircraft makes a rapid descent prior to the next minimum altitude, a Continuous Descent Final Approach technique has the following advantages:

1. Enhances safe approach operations by the utilisation of simplified standard operating practises;
2. Reduces pilot workload and enhances situational awareness;
3. Approach profile affords greater obstacle clearance along the final approach course;
4. Approach technique is similar to ILS techniques, including the missed approach and the associated go-around manoeuvre;

5. Affords procedural integration with Baro-VNAV approaches;

6. Aircraft attitude when on the required constant angle descent path facilitates acquisition of visual cues;

7. The constant angle descent profile flown in a stabilised manner is the safest approach technique for all type of approach operations;

8. Approach profile is fuel efficient; and

9. Approach profile affords reduced noise levels.

d. This ASN contains information air operators may utilize to develop Standard Operating Procedures and training for pilots in use of the continuous descent final approach (CDFA) technique for flying non-precision approach procedures in all aircraft types.

e. Modern aircraft may utilize aircraft navigation systems to achieve CDFA non-precision approach procedures utilizing Baro-VNAV and other navigation system capabilities.

2. RELATED CIVIL AVIATION REGULATIONS

3. BACKGROUND

Analysis of accident data indicates that the accident rate is five times greater during non-precision approaches than when aircraft are conducting precision approaches. In the interest of safety, air operators should discontinue the use of step-down or "dive-and-drive" non-precision approach procedures as soon as, and wherever possible. Air operators who have yet to do so should, at the earliest possible date, develop procedures and train pilots to fly continuous descent final approaches (CDFA) when flying non-precision approach procedures. All types of aircraft can fly procedures utilizing a constant rate descent, even those with just basic navigation capabilities.

The International Civil Aviation Organization *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS), Volume II, Part I, Section 4, Chapter 5, paragraph 5.3 states that, the minimum/optimum descent gradient is 5.2 per cent for the final approach segment of a non-precision approach with FAF (3° for a precision approach or approach with vertical guidance). Descent gradients steeper than the optimum should not be used unless all other means to avoid obstacles have been attempted since these steeper descent gradients may result in rates of descent which exceed the recommended limits for some aircraft on final approach. Additionally, Chapter 9, paragraph 9.4 of the same section states that the descent gradient(s)/angles used in the construction of the procedure shall be published for the final approach segment. It is preferable that they also be published for the other approach segments, where appropriate.

In addition, air operators are required to include in their standard operating procedures specific guidance to utilize on-board technology, combined with ground-based aids such as

distance measuring equipment (DME), to facilitate the execution of optimum constant approach slope descents during non-precision approaches.

4. CDFA PROCEDURES

a. Definitions

Approach procedure with vertical guidance (APV). An instrument approach procedure which utilizes lateral and vertical guidance but does not meet the requirements established for precision approach and landing operations.

Non-precision approach: An instrument approach procedure which utilizes lateral guidance but does not utilize vertical guidance.

Continuous descent final approach (CDFA). A technique, consistent with stabilized approach procedures, for flying the final approach segment of a non-precision instrument approach procedure as a continuous descent, without level-off, from an altitude/height at or above the final approach fix altitude/height to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare maneuver should begin for the type of aircraft flown.

b. Continuous Descent Final Approach (CDFA)

Operators should use the CDFA technique and apply increased visibility or RVR requirements when the technique is not used.

This technique requires a continuous descent, flown either with VNAV guidance calculated by onboard equipment or based on manual calculation of the required rate of descent, without level-offs. The rate of descent is selected and adjusted to achieve a continuous descent to a point approximately 15 m (50 ft) above the landing runway threshold or the point where the flare manoeuvre should begin for the type of aircraft flown. The descent shall be calculated and flown to pass at or above the minimum altitude at any step-down fix.

If the visual references required to land have not been acquired when the aircraft is approaching the MDA/H, the vertical (climbing) portion of the missed approach is initiated at an altitude above the MDA/H sufficient to prevent the aircraft from descending through the MDA/H. At no time is the aircraft flown in level flight at or near the MDA/H. Any turns on the missed approach shall not begin until the aircraft reaches the MAPt. Likewise, if the aircraft reaches the MAPt before descending to near the MDA/H, the missed approach shall be initiated at the MAPt.

Note 1. — Some States allow the use of the MDA/H as a Decision Altitude/Height (DA/H) under certain circumstances. Even when the MDA/H is used as a DA/H, the lateral (turning) portion of the missed approach may not be executed until the aircraft reaches the MAPt.

Note 2.— Many operators require pilots to add a prescribed increment to the MDA/H, e.g. 15 m (50 ft), to determine the altitude/height at which the vertical portion of the missed approach must be initiated in order to prevent descent below the MDA/H or DA/H. In such cases, there is no need to increase the RVR or visibility requirements for the approach. The RVR and/or visibility published for the original MDA/H should be used.

Note 3.— In all cases, regardless of the flight technique used, cold temperature correction must be applied to all minimum altitudes (see PANS OPS, Volume I, Part III, Section 1, Chapter 4, 4.3, "Temperature correction").

It should be emphasized that upon approaching the MDA/H only two options exist for the crew: continue the descent below MDA/H to land with the required visual references in sight; or, execute a missed approach. There is no level flight segment after reaching the MDA/H.

The CDFA technique simplifies the final segment of the non-precision approach by incorporating techniques similar to those used when flying a precision or APV approach procedure. The CDFA technique improves pilot situational awareness, and is entirely consistent with all "stabilized approach" criteria.

c. Descent and Level off at MDA/H

Other techniques involve a more expeditious descent and level off at MDA until the required visual reference is acquired. These techniques are not recommended as careful attention to altitude control is required due to the higher rates of descent before reaching the MDA/H; the increased time of exposure to obstacles at the minimum descent altitude and; thereafter, because of the increased risk of unstable approach being conducted from the MDA should the required visual reference be acquired late in the approach.

d. Training

The operator should ensure that prior to conducting CDFA each flight crewmember undertakes;

- The appropriate training and checking to include training on the techniques and procedures appropriate to the operation to be conducted that are discussed in paragraph 4.b. above;
- When approved to operate CDFA, the operator proficiency check for each pilot should include at least one CDFA to a landing or go around as appropriate. The approach should be operated to the lowest appropriate MDA(H); and if conducted in a Simulator the approach should be operated to the lowest approved RVR/Visibility;
- The policy for the establishment of continuous descent paths and stabilised approaches are to be enforced both during initial and recurrent pilot training and checking. The relevant training procedures and SOPs should be documented in the Operations Manual;
- The training should emphasize the need to establish and facilitate joint crew procedures and CRM to enable accurate descent path control and the requirement to establish the aeroplane in a stable condition as required by the operator operational procedures.
- Emphasis during training of flight crews should be placed on the:

- Need to maintain situational awareness at all times, in particular with reference to the vertical and horizontal profile;
- Need to maintain good crew communication throughout the approach;
- Ability to maintain accurate descent path control particularly during any manually flown descent phase. The non operating/non-handling/monitoring pilot should facilitate good flight path control by:
  - Monitoring of flight path during the whole approach including flight below MDA(H) to the landing;
  - Communicating any altitude/height crosschecks prior to the actual passing of the range/altitude or height crosscheck;
  - Prompting as appropriate changes to the target rate of descent;

- Actions to be taken at the MDA(H);
  - Need to ensure that the decision to go around must be taken early enough to avoid a temporary descent below the published MDA(H), specifically in case of an very early missed approach point (application of an "approaching minima" call);
  - Understanding of the need for prompt go around action if the required visual reference has not been obtained;
  - Understanding of the possible loss of the required visual reference when not conducting a CDFA for aeroplane types/class that require a late change of configuration and/or speed to ensure the aeroplane is in the appropriate landing configuration.

5. APPROACH OPERATIONS UTILIZING BARO-VNAV EQUIPMENT

5.1 Baro-VNAV equipment can be applied to two different approach and landing operations as defined in Annex 6:

a) *Approach procedure with vertical guidance (APV).* The APV/baro-VNAV approach and landing operations require the use of a VNAV system such as baro-VNAV. The lateral portion of APV/baro-VNAV criteria are based on RNP APCH non-precision approach criteria.

b) *Non-precision approach procedure.* In this case the use of a baro-VNAV system is not required but is used as auxiliary equipment to provide advisory VNAV guidance for the CDFA technique. Advisory baro-VNAV vertical guidance is used in conjunction with the lateral guidance provided by Basic GNSS either as part of a RNP APCH non-precision approach or as an overlay of a conventional non-precision approach. In the latter case, the primary lateral navigation guidance is predicated on

the navigation system designated on the chart, which should be monitored by the pilot during these operations.

5.2 For approaches flown coupled to a designated descent path using computed electronic glide-path guidance, (normally a nominal 3 degree path) the descent path should be appropriately coded in the flight management system data base and the specified navigational accuracy should be determined and maintained throughout the operation of the approach. To fly these approaches requires that the aircraft be equipped with a VNAV system as described in paragraph 5.1. With some exceptions, for FMS-equipped aircraft, the FMS database provider has coded a vertical path for every non-precision approach procedure.

5.3 Approach and landing operations with vertical guidance provide significant benefits over advisory VNAV guidance being overlaid on a non-precision approach, as they are based on specific procedure design criteria (see PANS OPS, Volume I, Part II, Section 4, Chapter 1 "APV/baro-VNAV procedures") avoiding the requirement for cross checking the non-precision approach procedure constraints such as step down fixes. These criteria furthermore address:

a) height loss after initiating a missed approach allowing the use of a DA instead of a MDA, thereby standardizing flight techniques for vertically guided approach operations;

b) obstacle clearance throughout the approach and landing phase taking into account temperature constraints down to the DA, therefore resulting in a better obstacle protection compared to a non-precision approach procedure.

Note 1.— Guidance on the operational approval for approach and landing operations with vertical guidance using baro-VNAV equipment can be found in the Performance Based Navigation Manual *(Doc 9613), Volume II, Part C, Chapter 5, "Implementing RNP APCH" and Volume II, Attachment "Barometric-VNAV"..*

Note 2.— For challenging obstacle environments or where tight separation requirements exist, specific procedure design criteria are available for approach and landing operations with vertical guidance. Associated operational approval guidance for RNP AR APCH operations can be found in the Performance Based Navigation Manual *(Doc 9613), Volume II, Part C, Chapter 6 "Implementing RNP AR APCH."*

5.4 When an APV approach is not available, the operator if equipped for Baro-VNAV operations and the non-precision approach is coded for VNAV, it is preferred to apply the CDFA technique using Baro-VNAV vertical guidance versus manual calculation.

6. APPLICABILITY

While operators can develop additional standard operating procedures for aircraft with more advanced navigation systems, they can also establish similar CDFA procedures for all aircraft types. This AC does not list every important SOP topic or dictate exactly how CDFA procedures should be developed. It provides guidance on some of the considerations for implementation of CDFA which air operators may adapt for their particular aircraft and operation.

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